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P/1228-204

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of

Johan LINDSTRÖM et al.

Serial No.: 10/557,666

Filed: December 13, 2005

For: ENERGY STORAGE

Confirmation No.: 2143

Date: August 18, 2008

Group Art Unit: 2838

Examiner: Jue ZHANG

Mail Stop Appeal Brief - Patents
Commissioner for Patents
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APPEAL BRIEF UNDER 37 C.F.R. §41.37

Sir:

This appeal is taken from the final action of December 17, 2007. In support of the Notice of Appeal filed June 17, 2008, the present Appeal Brief is presented.

I. Real Party in Interest

The real party in interest is the assignee, SCANIA CV AB.

II. Related Appeals and Interferences

The Applicants, the assignee and the undersigned attorney are not aware of any related appeals and interferences.

III. Status of Claims

Claims 1-5, 7-14 and 17-20 are pending and on appeal herein. Claims 6, 15 and 16 were previously canceled.

IV. Status of Amendments

An Response to the Final Office Action was filed on June 17, 2008. No amendments were made to the claims. An Advisory Action issued on July 7, 2008 indicating that the amendments in the Response After Final Office Action would not be entered, however, as is noted above, no amendments were included in this Response. Thus, no amendments have been submitted since issuance of the final Office Action.

V. Summary of Claimed Subject Matter

Claim 1 of the present application relates to an arrangement for storing electrical energy that includes an electric charge source (*See element 110 of Fig. 1, for example, and page 6 lines 14-19*) between a first terminal and a second terminal (*See terminals T1, T2 of Fig. 1, for example, and page 6, lines 14-20*), a plurality of electrical storage modules (*See elements 131, 132 of Fig. 1, for example, and page 6, lines 14-20*) connected in series between the first terminal and the second terminal (*See elements T1 and T2 of Fig. 1, for example, and page 6, lines 20-23*), each electrical storage module of the plurality of electrical storage modules having a respective nominal module voltage (*See elements 131, 132 of Fig. 1, for example, and page 6, lines 14-20*), a DC-to-DC converter (*See element 120 of Fig. 1, for example, and page 6 lines 14-20*) coupled to the electric charge source (*element 110 of Fig. 1*) and to each of the electrical storage modules (*elements 131, 132 of Fig. 1*), the DC-to-DC converter being operable to receive incoming power from the electric charge source and to supply a respective voltage fraction of the DC-system voltage to each electrical storage module (*See page 7 lines 1-12, for example*) wherein the DC-to-DC converter is further operable to control the respective voltage fraction to vary the respective voltage fraction over a time period (*See τ_{super1} or τ_{super2} of Figs. 3a-3b, for example, and page 8, lines 14-30*) within a voltage interval (*See V_D of Figs. 2 and 3a-3b, for example, and page 8, lines 31-34*) around the respective nominal module voltage (V_{1n}, V_{2n}) of each electrical storage module (131, 132) such that during the time period the respective voltage fraction supplied to each electrical storage module is set to be higher than the respective nominal module voltage of each electrical storage module (*See Figs. 3a-3b, for example, and page 8, lines 14-30*).

Claim 10 of the present application relates to a method of charging a plurality of electrical storage modules (*See elements 131, 132 of Fig. 1, for example, and page 6, lines 14-20*) connected in series between a first terminal and a second terminal (*See terminals T1, T2 of Fig. 1, for example, and page 6, lines 14-20*), the method including the steps of receiving a DC-system voltage between the first terminal and the second terminal (*See Fig. 7, step 710, for example, and page 12, lines 7-8*); DC-to-DC converting the DC-system voltage into a respective voltage fraction per electrical storage module (*See Fig. 7, step 720, for example, and page 12, lines 8-9*); supplying the respective voltage fraction to each electrical storage module (*See Fig. 7, step 730, for example, and page 12, lines 9-11-12*) and controlling the respective voltage fraction to vary over a time period within a voltage interval (V_D) around a respective nominal module voltage of each electrical storage module (*See Fig. 7, step 720, for example, and page 12, lines 9-11*) such that the respective voltage fraction supplied to each electrical storage module within the time period is set to be higher than the respective nominal module voltage of each electrical storage module (*See Figs. 3a-3b, for example, and page 8, lines 14-30*).

Independent claim 19 of the present application relates to an electric charge source (*See element 110 of Fig. 1, for example, and page 6 lines 14-19*) between a first terminal and a second terminal (*See terminals T1, T2 of Fig. 1, for example, and page 6, lines 14-20*), a plurality of electrical storage modules connected in series between the first terminal and the second terminal (*See elements 131, 132 of Fig. 1, for example, and page 6, lines 14-20*), each electrical storage module of the plurality of electrical storage modules having a respective nominal module voltage (*See elements 131, 132 of Fig. 1, for example, and page 6, lines 14-20*); and a DC-to-DC converter coupled to the electric charge source and to each of the electrical storage modules (*See element 120 of Fig. 1, for example, and page 6 lines 14-20*). The DC-to-DC converter (*element 120 of Fig. 1, for example*) is operable to receive incoming power from the electric charge source, to supply a respective voltage fraction of the DC-system voltage to each electrical storage module (*See page 7 lines 1-12, for example*), to vary each respective voltage fraction over a period of time (*See τ_{super1} or τ_{super2} of Figs. 3a-3b, for example, and page 8, lines 14-30*) within a voltage interval (V_D of Figs. 2, 3a-3b, for example, described at page 8, lines 31-34) around the respective nominal module voltage (V_{1n}, V_{2n}) of each electrical storage module (131, 132) such that within the period of time (τ_{super1} or τ_{super2}) the respective voltage fraction supplied to each electrical storage module (131, 132) is set to be higher than the respective nominal module

voltage of each electrical storage module to control the respective voltage fraction over the electrical storage modules (*See Figs. 3a-3b, for example, and page 8, lines 14-30*) such that an average time interval during which the respective voltage fraction exceeds the respective nominal module voltage is substantially equal for all the electrical storage modules (*See Page 9, lines 5-8, for example*) and to control the respective voltage fraction over the electrical storage modules such that an average voltage fraction of the DC-system voltage being supplied to each electrical storage module is substantially equal in magnitude for all the electrical storage modules (*See page 9, lines 15-18, for example*).

VI. Grounds of Rejection to be Reviewed

The following grounds of the rejection are presented for review:

1. Whether claims 1, 3-5, 7-10, 12-14 and 17-20 were correctly rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 5,952,815 to Rouillard et al. (hereinafter “Rouillard”).
2. Whether claims 2 and 11 were correctly rejected under 35 U.S.C. §103(a) as being unpatentable over Rouillard.

VII. Argument

Rejection of claims 1, 3-5, 7-10, 12-14 and 17-20 under 35 U.S.C. 102(b)

Claims 1, 3-5, 7-10, 12-14 and 17-20 were rejected as allegedly being anticipated by Rouillard.

Applicants respectfully disagree with the Examiner’s interpretation of the prior art Rouillard patent, since several features in independent claims 1, 10 and 19 are clearly new in relation to the disclosures in this document.

As was noted in Applicants’ previous response dated June 17, 2008, Rouillard does not disclose “a DC-to-DC converter coupled to the electric charge source and to each of the electrical storage modules, the DC-to-DC converter being operable to receive incoming power from the

electric charge source and to supply a respective voltage fraction of the DC-system voltage to each electrical storage module wherein the DC-to-DC converter is further operable to control the respective voltage fraction to vary the respective voltage fraction over a time period within a voltage interval around the respective nominal module voltage of each electrical storage module such that during the time period the respective voltage fraction supplied to each electrical storage module is set to be higher than the respective nominal module voltage of each electrical storage module,” as is required by claim 1, for example.

As an initial matter, it does not appear that Rouillard specifically discloses a DC-to-DC converter at all. The Examiner asserts that a DC-to-DC converter is disclosed in Fig. 31 of Rouillard. In the Advisory Action dated July 7, 2008, the Examiner includes an annotated version of Fig. 31 in which a box is drawn around the equalizer modules 302. The Advisory Action refers to the added box as a DC-DC converter. However, the modules 302 are not DC-to-DC converters. As was explained in Applicants’ previous response, the equalizers monitor voltage across the individual cells and activate the bypass circuit 346 when appropriate to allow the charging circuit to bypass the cell. That is, they prevent overcurrent from being provided to each cell. However, they are not converters themselves.

Further, it follows that Rouillard also fails to disclose a DC-to-DC converter that is “coupled to the electric charge source” or that it is connected “to each of the electrical storage modules.” As is noted above, there does not appear to be any disclosure in Rouillard of a DC-to-DC converter, as required by claim 1, for example of the present application. However, even if the equalizer modules 302 of Rouillard were DC-to-DC converters, none of these modules is connected to each of the cells C1, C2, and CN.

In addition, there is no disclosure in Rouillard of a DC-to-DC converter “operable to control the respective voltage fraction to vary the respective voltage fraction over a time period within a voltage interval around the respective nominal module voltage of each electrical storage module such that during the time period the respective voltage fraction supplied to each electrical storage module is set to be higher than the respective nominal module voltage of each electrical storage module.” Again, as is noted above, there is no disclosure in Rouillard of a DC-to-DC converter at all. Further, there is no disclosure anywhere in Rouillard of any element is “operable to control the respective voltage fraction to vary the respective voltage fraction over a time

period..." as is further required by claim 1. In the Advisory Action, the Examiner argues that Fig. 35 allegedly discloses this feature. However, this is also incorrect.

Fig. 35 of Rouillard merely shows a voltage waveform of a cell subjected to the equalization procedure disclosed therein. While the waveform changes as the transistor 342 is turned on and off to bypass the cells as desired, there is no disclosure in Rouillard of varying the voltage over a specific time period within a specific voltage interval, as is required by claim 1, for example, of the present application. The voltage waveform of Fig. 35 does not appear to vary over any particular defined voltage interval. Further, there is no defined time period at all, much less one in which the voltage is "set to be higher than the respective nominal module voltage of each electrical storage module," as is also required by claim 1. As was described in Applicants' previous response, the modules 302 are used to control a charging current based purely on the voltage of the cells, there is no consideration of a time period at all. That is, the variations in the voltage waveform provided to the cell in Rouillard have nothing whatever to do with a particular voltage interval or a specific period of time.

Thus, Rouillard fails to disclose all of the features of claim 1 of the present application.

Independent claim 10 of the present application relates to a method of charging a plurality of electrical storage modules including DC-to-DC converting the DC-system voltage into a respective voltage fraction per electrical storage module, supplying the respective voltage fraction to each electrical storage module and controlling the respective voltage fraction to vary over a time period within a voltage interval around a respective nominal module voltage of each electrical storage module such that the respective voltage fraction supplied to each electrical storage module within the time period is set to be higher than the respective nominal module voltage of each electrical storage module.

As is noted above, Rouillard does not disclose the DC-to-DC conversion of the present application. Rouillard also fails to disclose varying the respective voltage fraction over a time period within a voltage interval around a respective nominal module voltage of each electrical storage module such that the respective voltage fraction supplied to each electrical storage module within the time period is set to be higher than the respective nominal module voltage of each electrical storage module as is required by the method of claim 10.

Thus, Rouillard fails to disclose all of the features of claim 10 of the present application.

Independent claim 19 recites an electrical energy storage system including “a DC-to-DC converter coupled to the electric charge source and to each of the electrical storage modules, the DC-to-DC converter being operable to: receive incoming power from the electric charge source; to supply a respective voltage fraction of the DC-system voltage to each electrical storage module” and “to vary each respective voltage fraction over a period of time within a voltage interval around the respective nominal module voltage of each electrical storage module such that within the period of time the respective voltage fraction supplied to each electrical storage module is set to be higher than the respective nominal module voltage of each electrical storage module.” As is described above, Rouillard fails to disclose these features.

Thus, Rouillard fails to disclose all of the features of claim 19 of the present application.

The remaining claims depend from one of claims 1, 10 and 19, and thus, are believed to be patentable over Rouillard for at least the reasons described above.

Rejection of claims 2 and 11 under 35 U.S.C. 103(a)

Claims 2 and 11 were rejected under 35 U.S.C. §103(a) as being unpatentable over Rouillard. Claims 2 and 11 depend from claims 1 and 10, respectively. As is described above, Rouillard does not disclose all of the features of claims 1 and 10. Further, it would not have been obvious to modify Rouillard to include these features.

For at least the foregoing reasons, allowance of claims 1-5, 7-14 and 17-20 is requested.

VIII. Conclusion

The amount of \$510.00 to cover the 37 C.F.R. §41.20(b)(2) fee for filing an Appeal Brief should be charged to Patent and Trademark Office Deposit Account No. 15-0700. Any additional fees or charges required at this time in connection with this application may be charged to Patent and Trademark Office Deposit Account No. 15-0700.

If this communication is filed after a shortened statutory time period has elapsed and no separate Petition is enclosed, the Commissioner of Patents and Trademarks is petitioned, under 37 C.F.R. §1.136(a), to extend the time for filing a response to the outstanding Office Action by

the number of months which will avoid abandonment under 37 C.F.R. §1.135. The fee under 37 C.F.R. §1.17 should be charged to our Deposit Account No. 15-0700.

In the event the actual fee is greater than the payment submitted or is inadvertently not enclosed or if any additional fee during the prosecution of this application is not paid, the Patent Office is authorized to charge the underpayment to Deposit Account No. 15-0700.

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as First Class Mail in an envelope addressed to: Mail Stop Appeal Brief - Patents, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on August 18, 2008:

Respectfully submitted,



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August 18, 2008

Date of Signature

RCF/KJB

APPENDIX

The claims on appeal are:

1. An arrangement for storing electrical energy comprising:
an electric charge source between a first terminal and a second terminal,
a plurality of electrical storage modules connected in series between the first terminal and the second terminal, each electrical storage module of the plurality of electrical storage modules having a respective nominal module voltage;
a DC-to-DC converter coupled to the electric charge source and to each of the electrical storage modules, the DC-to-DC converter being operable to receive incoming power from the electric charge source and to supply a respective voltage fraction of the DC-system voltage to each electrical storage module
wherein the DC-to-DC converter is further operable to control the respective voltage fraction to vary the respective voltage fraction over a time period within a voltage interval around the respective nominal module voltage of each electrical storage module such that during the time period the respective voltage fraction supplied to each electrical storage module is set to be higher than the respective nominal module voltage of each electrical storage module.
2. The arrangement according to claim 1, wherein the voltage interval represents a voltage variation of less than 25% of the nominal module voltage.
3. The arrangement according to claim 1, wherein the DC-to-DC converter is operable to control the respective voltage fraction over the electrical storage modules such that an average time interval during which the voltage fraction exceeds the nominal module voltage is substantially equal with respect to all the modules.
4. The arrangement according to claim 1, wherein the DC-to-DC converter is operable to control the respective voltage fraction over the electrical storage modules such that an average voltage fraction of the DC-system voltage being distributed to each module is substantially equally large for all the modules.

5. The arrangement according to claim 1, wherein at least two of the electrical storage modules are included in a common battery unit, the unit having a separate set of access points for each module, and each of the access points is coupled to the DC-to-DC converter.

6. (Canceled)

7. The arrangement according to claim 1, wherein the electrical storage modules are operable to provide power to an electrical system of a vehicle via the first and second terminals.

8. The arrangement according to claim 1, wherein the electric charge source is an electric generator.

9. A motor vehicle comprising an arrangement for storing electrical energy according to claim 1.

10. A method of charging a plurality of electrical storage modules connected in series between a first terminal and a second terminal, the method comprising the steps of:

receiving a DC-system voltage between the first terminal and the second terminal;

DC-to-DC converting the DC-system voltage into a respective voltage fraction per electrical storage module;

supplying the respective voltage fraction to each electrical storage module ; and

controlling the respective voltage fraction to vary over a time period within a voltage interval (V_D) around a respective nominal module voltage of each electrical storage module such that the respective voltage fraction supplied to each electrical storage module within the time period is set to be higher than the respective nominal module voltage of each electrical storage module.

11. The method according to claim 10, wherein the voltage interval represents a voltage variation of less than 25% of the nominal module voltage.

12. The method according to claim 10, further comprising controlling the respective voltage fraction over the electrical storage modules such that an average time interval during which the respective voltage fraction exceeds the respective nominal module voltage is substantially equal with respect to all the modules.

13. The method according to claim 10, further comprising controlling the respective voltage fraction over the electrical storage modules such that an average voltage fraction of the DC-system voltage being distributed to each module is substantially equally large for all the modules.

14. The method according to claim 10, wherein there are two electrical storage modules.

15 - 16. (Canceled)

17. The arrangement according to claim 1, wherein the DC-to-DC converter is operable to control the respective voltage fraction such that when the respective voltage fraction is varied to be above the respective nominal module voltage, another respective voltage fraction is varied to be below the respective nominal module voltage for another respective module.

18. The method according to claim 10, wherein the voltage fraction is controlled such that when the respective voltage fraction is varied to be above the respective nominal module voltage, another respective voltage fraction is varied to be below the respective nominal module voltage for another respective module.

19. An electrical energy storage system comprising:

an electric charge source between a first terminal and a second terminal,

a plurality of electrical storage modules connected in series between the first terminal and the second terminal, each electrical storage module of the plurality of electrical storage modules having a respective nominal module voltage; and

a DC-to-DC converter coupled to the electric charge source and to each of the electrical storage modules, the DC-to-DC converter being operable:

to receive incoming power from the electric charge source;

to supply a respective voltage fraction of the DC-system voltage to each electrical storage module;

to vary each respective voltage fraction over a period of time within a voltage interval around the respective nominal module voltage of each electrical storage module such that within the period of time the respective voltage fraction supplied to each electrical storage module is set to be higher than the respective nominal module voltage of each electrical storage module;

to control the respective voltage fraction over the electrical storage modules such that an average time interval during which the respective voltage fraction exceeds the respective nominal module voltage is substantially equal for all the electrical storage modules; and

to control the respective voltage fraction over the electrical storage modules such that an average voltage fraction of the DC-system voltage being supplied to each electrical storage module is substantially equal in magnitude for all the electrical storage modules.

20. The system of claim 19, wherein the DC-to-DC converter is further operable to control the respective voltage fraction such that when the respective voltage fraction is varied to be above the respective nominal module voltage, another respective voltage fraction is varied to be below the respective nominal module voltage for another respective module.

EVIDENCE APPENDIX

None

RELATED PROCEEDINGS APPENDIX

None